

ISO 19725:2026-05 (E)

Road vehicles - Steer-by-wire systems - System safety guidelines

Contents

Page

Foreword.....	v
Introduction.....	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 List of symbols	4
5 Derivation of the safety goals	4
5.1 System boundary.....	4
5.2 SbW malfunctioning behaviours.....	7
5.3 Safety goals.....	7
5.3.1 General.....	7
5.3.2 Safety goal SG1: Self-steering shall be prevented while driving.....	8
5.3.3 Safety goal SG2: Loss of steerability shall be prevented while driving.....	9
5.3.4 Safety goal SG3: Loss of feedback torque to the driver shall be prevented while driving.....	10
5.3.5 Safety goal SG4: Unintentional blocking of the steering wheel shall be prevented while driving.....	11
5.3.6 Safety goal SG5: Unintended loss of synchronization between the SbW actuators shall be prevented while driving.....	12
6 System availability requirements	13
6.1 Availability requirements.....	13
6.2 Availability requirements after fault.....	14
6.3 Availability requirements for mechanical system parts.....	15
7 Controllability in the event of a first fault	15
7.1 Introduction and general information on controllability.....	15
7.2 Failure pattern.....	16
7.2.1 General.....	16
7.2.2 Malfunction behaviours.....	16
7.2.3 Failure source.....	16
7.2.4 Failure type.....	16
7.2.5 Failure characteristics with the associated physical values.....	17
7.2.6 Failure pattern with loss of actively generated feedback torque - supplementary instruction.....	22
7.3 Failure pattern matrix.....	23
7.4 Assessment of controllability in case of a fault.....	24
7.4.1 General.....	24
7.4.2 Failure pattern-driving manoeuvre combinations.....	25
7.4.3 Controllability thresholds.....	25
7.4.4 Subjective controllability assessment and related objective vehicle dynamics characteristics.....	26
7.5 Driving manoeuvres and test execution for the assessment of controllability in the event of a fault.....	27
8 Minimum requirements for operating behaviour after a fault	27
8.1 Introduction and general description of the degradation concept.....	27
8.2 Degradations and transitions.....	29
8.2.1 Normal operation N.....	29
8.2.2 Transition x-2 and Degradation 2.....	29

8.2.3	Transition 2-3 and Degradation 3	30
8.2.4	Transition x-emergency stop.....	30
8.2.5	Transition N-1 and Degradation 1.....	30
8.2.6	Transition x-3	30
8.3	General requirements of the degradation concept.....	31
8.3.1	Controllability during degradations and transitions.....	31
8.3.2	Electrical power supply system.....	31
8.3.3	Shortened transitions.....	31
8.3.4	Performance requirements for the vehicle lateral acceleration.....	32
8.3.5	Unrestricted continued driving before an automated speed reduction.....	32
8.3.6	Overriding the automated speed reduction and speed limiter	33
8.3.7	Braking during the automated speed reduction.....	33
8.4	Differentiation of vehicle systems.....	33
8.5	Minimum requirements for degradations and transitions.....	33
8.5.1	General	33
8.5.2	System integrity and speed limitations.....	34
8.5.3	Requirements for ASIL capability	40
8.5.4	Time-limited usage	41
8.5.5	Re-transitioning and its conditions.....	43
8.5.6	Requirements for the warning concept.....	46
8.5.7	Minimum requirements for lateral control and controllability of the vehicle.....	47
8.6	Manoeuvre sequences and their requirements.....	48
8.6.1	General explanations.....	48
8.6.2	Goals of the manoeuvre sequences and associated manoeuvres.....	48
8.6.3	General requirements.....	50
Annex A (normative) Driving manoeuvres for assessment of controllability		52
Annex B (normative) Tests to verify vehicle lateral control and controllability in the degradations and transitions.....		62
Annex C (informative) Development responsibility		86
Annex D (informative) Experience values from test series during the preparation of the standard.....		91
Annex E (informative) Explanation of degradation concept.....		94
Bibliography.....		100